Primary Pulmonary Resection for Tuberculosis

Medical and Economic Aspects in a Small Sanatorium

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• Twenty-eight patients with pulmonary tuberculosis in a small, tax-supported sanatorium were treated by primary pulmonary resection. In a comparison of results with those obtained in the same sanatorium by thoracoplasty and extrapleural pneumothorax, it was noted that in general the patients who had resection had earlier conversion of sputum to "negative" and had a shorter stay in hospital.

Complications were not of sufficient frequency to contraindicate use of resection in cases in which there was doubt that thoracoplasty would be effective.

The cost of hospitalization for surgical treatment and postoperative care was considerably less when resection was done than it was for either three-stage or two-stage thoracoplasty.

IN THE PAST THREE YEARS pulmonary resection has been used in an increasing proportion of cases at Bret Harte Sanatorium, a 230-bed hospital operated by San Joaquin County for tuberculous patients. Since the acceleration of the program, data have developed that permit comparison of results of resection with those obtained in the same hospital by thoracoplasty and by extrapleural pneumothorax. Also some light is cast on medicoeconomic factors with regard to the three methods.

Data on the length of time between treatment and the disappearance of tubercle bacilli from the sputum—"conversion"—are given in Table 1. It is noteworthy that 75 per cent of the patients subjected to resection had conversion within two months, whereas in the thoracoplasty group only 15.3 per cent had conversion in that length of time. (Not included in the table are the nine cases in which resection was done most recently. In all of them conversion occurred within two months, making 31 two-month conversions in a total of 37 patients who had resection.) Results obtained with extrapleural pneumothorax cannot be equitably compared with results in patients treated by thoracoplasty, of course, for pneumothorax was used for patients in whom the conversion rate would have been relatively high whatever the method of treatment.

It is still too early to gauge the long-term results of resection or to say what the future of the program will be. It is perhaps indicative, however, that 23.3 per cent of patients who had thoracoplasty and 10 per cent of those treated by extrapleural pneumothorax did not have conversion of sputum to "negative," whereas all living patients in whom resection was done had conversion before they left the sanatorium.

TABLE 1.—*Sputum Conversion Rates Concomitant with Various Methods of Treatment*

Conversion Months Postoperatively	Thoracoplasty (124 cases)	Extrapleural Pneumothorax (76 cases)	Pulmonary Resection (28 cases)
0-2	15.3*	30.0*	75.0*
2-4	11.5	12.0	4.2
4-6	8.6	26.0	4.2
Total within 6 months	34.4	68.0	83.4
Over 6 months	42.3	22.0	8.2
Not converted	23.3	10.0	8.2

*Expressed in per cent of cases in which sputum converted to negative from positive in stated period.

Charts 1 and 2 show the number of operative procedures in each of the three categories and the relative frequency of use of each method. Decreases in thoracoplastic and extrapleural procedures since 1949 have been more than compensated for by an increase in resections. Since thoracoplasty is done in stages whereas resection takes but one operation, the total number of operations has decreased. Also in the last two years thoracoplasty has been done more often in two stages rather than three as previously (without change, however, as to the number of ribs removed).

In recent years a higher proportion of patients admitted have been treated surgically (Table 2). There are two reasons for this. One is that the three surgeons who carry out the procedures have been operating four times a month since 1950, as against twice monthly theretofore. The other is that during the last three or four years there has been a gradual increase in the number of patients who, because of chronic alcoholism or mental instability, are not

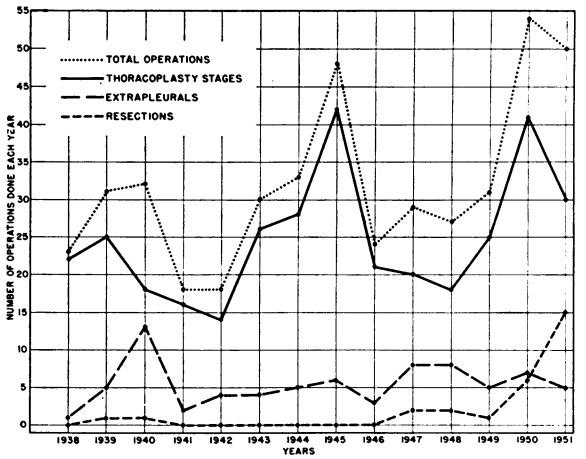

Chart 1.—Total number of operations and the numbers of each kind in period 1938-1951 inclusive.

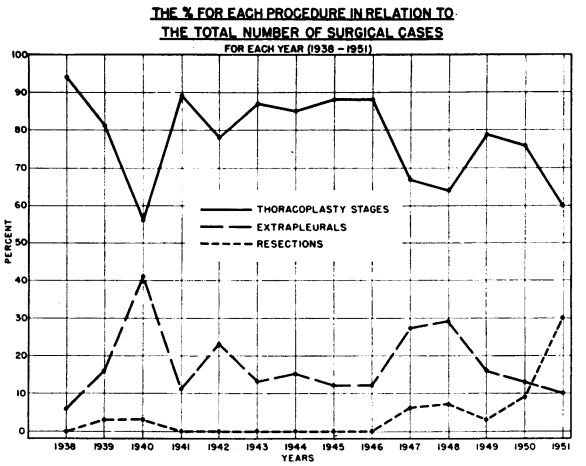

Chart 2

suitable candidates for a regimen based upon a reversible collapse procedure, which necessitates cooperation on their part.

The question of how long a patient is to stay in the sanatorium is difficult to answer, since in most institutions the availability of beds is a strong factor. At Bret Harte the preoperative care of patients who are to have resection is the same as that in most institutions, but postoperative care is somewhat different. Patients are advised before resection that no matter what the results of the operation, they will have to remain in bed for six months postoperatively. The reason for this is that, in the operation, attempt is made to preserve all but that portion of the lung which cannot be collapsed by surgical or other means. If at the time of operation a few nodules are felt in the remaining lobes, the surgeons leave them unless there is cavitation. In no case have there been complications attributable to rest in bed postoperatively. In a few instances patients who felt

TABLE 2.—*Number of Patients Operated Upon in Relation to Number Admitted During Year*

Year	Proportion Operated Upon (per cent)	Year	Proportion Operated Upon (per cent)
1938	15	1945	30
1939	19	1946	14.7
1940	19.3	1947	15.6
1941	12	1948	13.6
1942	12.4	1949	16
1943	18.7	1950	24.5
1944	20	1951	22.2

well could not be made to stay in bed for the prescribed period.

Postoperative chemotherapy as practiced at Bret Harte may differ from that in many institutions in that patients are given streptomycin intermittently and para-aminosalicylic acid daily for three months. The average length of stay in the sanatorium following resection was 11 months, as against 12 months after extrapleural pneumothorax, and 15 months after thoracoplasty. It is recognized, however, that the resection series is so small (28 cases) that definite conclusions are not warranted.

COMPARISON OF COSTS

Valid comparison of the costs of the various kinds of operation can be made, however, if it be assumed that in a given case either thoracoplasty or resection could be used. Patients at Bret Harte Sanatorium must be transported 75 miles to a general hospital for any major operation, and the hospital charges the county a set rate daily, based upon the cost of caring for patients undergoing operation at that institution. The average bill to the county for patients who had resection was $340, against $800 for three-stage and $512 for two-stage thoracoplasty. For extrapleural pneumothorax the cost was $258. The comparison of costs, it should be noted, came after the fact; the differences in cost were not a factor in choice between procedures. The staff is keenly interested, however, in avoiding trial thoracoplasty for a patient who would be better served by resection. Of 37 resections done up to the time of this report, only three were in cases in which thoracoplasty had been done earlier—before 1944 in two instances. One was in a case in which extrapleural pneumothorax had failed.

The indications for resection in the group of 37 patients were as follows: Bronchostenosis, totally destroyed lung, giant cavities, bronchiectasis, lower lobe cavities, nonexpansile lung with cavitation still present, cavitation which might not have closed with thoracoplasty, failure of thoracoplasty, and failure of extrapleural pneumothorax. Of the 37 patients, ten had upper lobe lobectomy with concomitant thoracoplasty. In three cases in which pneumonec-

tomy was done, the remaining pleural space was filled with air, and refilling was done from time to time for periods up to two years with no complications. In two other cases, the pleural space was allowed to fill with serum and no postoperative thoracoplasty was done. In two cases concomitant thoracoplasty was carried out.

COMPLICATIONS

Complications following resection were not such as to change the authors' belief that upper lobe lobectomy, with concomitant thoracoplasty, is to be preferred in suitable cases over thoracoplasty alone. Nor was the factor of complications of sufficient weight, all things considered, to gainsay primary resection in cases in which thoracoplasty might not be effective. The complications that occurred in the first 28 resections done are listed in Table 3. (No complications occurred in the next nine resections.) Bronchopleural fistula occurred in four cases—in two instances before the advent of streptomycin. Two of the four patients in whom fistula developed died (one in the prestreptomycin era and one after the drug became available); the other two are alive and well with the fistula closed. In the two cases in which contralateral spread occurred, the patients had left the sanatorium against medical advice within three and a half to four months postoperatively. Both were back within three months after leaving, and one of them died. The four patients in whom fistula developed and the three who died had had pneumonectomy. Taking two months postoperatively as a time limit, there were no postoperative deaths in the resection or extrapleural group, five in the thoracoplasty group.

TABLE 3.—*Complications Associated with Surgical Procedures*

	Thoracoplasty (124 cases)	Extrapleural Pneumothorax (76 cases)	Resection (28 cases)
Wound infection	14	0	1
Contralateral spread	6	4	2
Ipsilateral spread	2	1	0
Respiratory disability, dyspnea	2	0	0
Bronchopleural fistula	0	0	4
Rapid reexpansion	0	1	0
Postoperative death (within 60 days)	5	0	0

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